

**WHAT IS CLAIMED IS:**

1. A wavelength division multiplexed optical communication system for transmitting a plurality of optical communication channels on an optical waveguide, each optical communication channel having a distinct channel wavelength, the optical communication system comprising:

a first set of one or more optical transmitters, each optical transmitter configured to transmit an information-bearing optical signal at a particular wavelength;

one or more remodulators optically communicating with the optical transmitters in the first set of optical transmitters, the remodulators placing information from the information-bearing optical signals of the first set of optical transmitters onto optical channels in the wavelength division multiplexed optical communication system, each of the remodulators comprising:

an optical-to-electrical conversion element for receiving a transmitter information-bearing optical signal and outputting an electrical signal corresponding to information from the transmitter optical signal;

means for receiving the electrical signal output by optical-to-electrical conversion element and separating the received signal into N electrical signals, where N is a whole number greater than or equal to 2;

N means for creating optical signals including the information from each of the N electrical signals, each of the N optical signal-creating means communicating with the means for separating the received signal into N electrical signals, the N optical signal-creating means each outputting an information-bearing optical signal corresponding to an optical channel in the wavelength division optical communication system;

an optical waveguide;

an optical combining element optically communicating with the optical channels produced by the remodulators, the optical combining element combining the

remodulator optical channels to form a multiplexed optical signal output to the optical waveguide;

- 5 a plurality of optical selectors optically communicating with the optical waveguide, each optical selector configured to select one or more optical channels in the wavelength division multiplexed optical communication system; and
- a plurality of optical receivers optically communicating with the optical selectors.

- 10 2. A wavelength division multiplexed optical communication system as recited in claim 1 wherein each of the N means for creating optical signals includes a laser and a modulator.

- 15 3. A wavelength division multiplexed optical communication system as recited in claim 2 wherein the modulator is an electro-optic modulator.

4. A wavelength division multiplexed optical communication system as recited in claim 3 wherein the electro-optic modulator includes a Mach-Zehnder interferometer.

- 20 5. A wavelength division multiplexed optical communication system as recited in claim 3 wherein the modulator is an electro-absorption modulator.

- ✓ 6. A wavelength division multiplexed optical communication system comprising:
- an optical transmitter which produces a modulated optical signal;
- an optical remodulator optically communicating with the optical transmitter,
- 25 for placing information from the modulated optical signal of the optical transmitter onto plural optical channels in the wavelength division multiplexed optical communication system, the remodulator comprising:

an optical-to-electrical conversion element for receiving the transmitter modulated optical signal and outputting an electrical signal corresponding to information from the transmitter optical signal;

an electrical demultiplexer for receiving the electrical signal output  
5 by optical-to-electrical conversion element and separating the received signal into N electrical signals, where N is a whole number greater than or equal to 2,

N remodulator lasers for emitting continuous wave optical carrier signals, the wavelength of each of the optical carrier signal being the wavelength of an optical channel in the wavelength division multiplexed optical communication system;

10 N modulators for modulating each of the optical carrier signals emitted by the remodulator lasers, each of the N modulators communicating with one of the N electrical signals output from the separating means for imparting the information from the electrical signal to the optical signal through the modulator to create an information-bearing optical signal corresponding to an optical channel in the wavelength division optical  
15 communication system;

an optical waveguide;

an optical combining element optically communicating with the optical channels produced by the remodulators, the optical combining element combining the remodulator optical channels to form a multiplexed optical signal output to the optical  
20 waveguide;

a plurality of optical selectors optically communicating with the optical waveguide, each optical selector configured to select one or more optical channels in the wavelength division multiplexed optical communication system;

a plurality of optical receivers optically communicating with the optical  
25 selectors; and

an electrical multiplexer for creating a multiplexed electrical signal including the information from each of the optical channels output by the remodulator.

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